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# ENERGY CONSERVATION MATERIALS PACKAGE

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# Energy Conservation in School Transportation Systems

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# ENERGY CONSERVATION IN SCHOOL TRANSPORTATION SYSTEMS

## INTRODUCTION

Energy Conservation in Pupil Transportation is fast becoming a major area of concern to the educational population. School buses travel more than 2.3 billion miles annually using three-hundred-sixty-million gallons of fuel. These vehicles transport 60% of the total children attending grades K through 12.

Since the energy crunch occurred, pupil transportation has employed major conservation measures that have reduced the amount of fuel required to transport children to and from school and school authorized activities.

Here are some of the basic guidelines for sound fuel reductions in school transportation. From these guidelines, a comprehensive checklist can be developed for use by individual school districts.

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# SCHOOL TRANSPORTATION

Driver Education Cars & Teachers
Maintenance Vehicles
School Buses

## General Energy Practices

1. Have one person in charge of all energy for transportation.

   Designate one person to be the Energy Coordinator for the school district. This person will:

   --be in touch with local, state, and federal energy offices.

   --keep all forms such as FEA forms on hand and know where, how, and when to file them, and to follow up on them.

   --keep the various departments informed of the energy situation at all times, i.e., cut back in heating fuels, bus fuels, etc., or rationing.

2. Conduct an Energy Audit--begin at all places where fuel is used.

   a. The Audit should be a month-by-month use for three years with estimates for the current year. Included should be prices, suppliers, bulk storage data, delivery dates and practices.

   b. Information should be accurate and specific, not general.

   c. Analyze fuel supply availability and current needs. Which months require the most gasoline or diesel? Which months require the least gasoline?

   d. Set up action plans.

   e. Set up contingencies for time when fuel is in short supply.

   f. Monitor programs as devised to see if they are being effectively carried out.

Remember the school which systematically identifies and evaluates its needs and supplies, highs and lows, can tailor programs more effectively in advance--rather than be caught short.

General Considerations

1. The people are very well informed by the media on the need and method of conservation and expect the schools to exert a leadership role.

2. There shall not be major operational differences between school districts within the city or local areas. Communicate with surrounding school leaders and share program ideas.

3. The problem of community support of the schools in place of program reductions extends beyond the basic program of education impact to the total program offered through school facilities including community services, adult education and recreation programs.

# DRIVER EDUCATION PROGRAM

1. Automobile manufacturers should be encouraged to adjust their free loan program to permit greater use of intermediate and smaller size cars. Schools should be encouraged to use intermediate and smaller cars when available.
2. Public schools should conduct each behind-the-wheel lesson at the full capacity (4 students and the instructor) of the vehicle.
3. Driving simulation and multiple car off-street driving ranges should be utilized whenever feasible to reduce on-street behind-the-wheel driving time.
4. Cars should be stored centrally, not taken home by instructors.
5. Driver education vehicles shall be used only for driver education lab instruction.
6. Each behind-the-wheel lesson should be accomplished in fewer miles and in a limited geographic area.
7. Freeway and open highway driving should be reduced and done at reduced speeds.
8. Use winter months primarily for classroom work and put behind-the-wheel classes on during warmer and lighter days, if possible.
9. Vehicles should be equipped with steel belted radial tires with more air pressure in tires to reduce gasoline consumption.
10. Pre-test students and give credit for previous training and experience. Reduce hours based on results of pre-test.

## SCHOOL VEHICLES - MAINTENANCE EQUIPMENT

(Other Than School Buses)

### Car Pools

1. Make one office staff person available to help formulate car pools for office staff, janitors, cooks, and teachers.

2. Issue school parking places with priority granted to car pool riders for staff personnel and students.

### Maintenance Vehicles

The good rules of maintenance apply to any and all vehicles, motors, and equipment.

1. Tune and maintain engines on all vehicles to peak performance. Correct faulty spark plugs, points, and carburetion.

2. Avoid full throttle operation.

3. Monitor use of all vehicles.

4. Keep gas tanks full to avoid excessive evaporation.

5. Drive slowly and easily the first few miles until vehicle warms up.

6. Ensure that vehicle tires are properly inflated or to the maximum safety level. Soft tires increase gas consumption.

7. Reduce speed limit of vehicles as low as practical.

8. Evaluate the possibility of satellite vehicle parking stations at the extremities of districts to avoid "deadheading" back to centralized garages.

9. Train drivers to use pre-planned starts and stops.

10. Install trip recorders to record driver and vehicle operation. Use this information to reduce use of gas and oil.

11. Use modern analyzing equipment to ensure fuel and oil economy for all vehicles.

12. Lock gas tanks to avoid theft.

# OPERATION OF SCHOOL VEHICLES AND SERVICES WHICH ARE TRANSPORTATION RELATED

1. Develop an information exchange of ideas on fuel conservation between districts and with industry. Coordinate transportation with other public agencies.

2. Coordinate and consolidate pick-ups, deliveries, and messenger service between schools through the central office.

3. Make warehouse deliveries to schools on a very minimal basis.

4. Encourage all employees to ask themselves the following questions before undertaking a trip: Can someone else do it who is going that way? Can I deliver something for someone else? Can I do it on the way home?

5. Adopt policy for all trips by employees to meetings, conferences, conventions, etc. Limit amount of mileage allowance. Establish policy on distance to walk to meetings.

6. Utilize conference telephones as substitutes for small meetings.

7. Use telephone calls instead of home calls where feasible.

8. Install two-way radios to direct operation or redirect district vehicles to reduce mileage.

9. Request that all district employees form car pools when traveling on official business.

10. Coordinate conferences out of district for sharing rides. Use a central location as place of embarkation.

11. Have district personnel, who service a number of schools, coordinate trips to include as many stops as possible and include other district personnel serving the same schools.

12. Explore the idea of setting up a dispatcher system so that maintenance crews would not be making duplicate trips to various schools.

13. Develop a system for ordering supplies for all departments so as to keep deliveries at a minimum with a maximum load per trip.

14. Communicate with all related organizations, i.e., PTA, Board of Education, to share ideas ... and car pools.

## Mechanical and Shop Program

1. Tune and maintain engines, plugs, points, and timing. Maintain and clean pollution controls.
2. Keep gas tanks full to avoid excessive evaporation.
3. Ensure that bus tires are properly inflated. Soft tires increase gas consumption. Inflate to maximum safe level.
4. Replace as soon as possible buses that use excessive amounts of gasoline.
5. Keep gasoline tanks locked with one person in charge of fueling of buses and other school vehicles.
6. Keep accurate bus records for maintenance and fuel consumption, oil changes, lubrication, etc.
7. Be sure that all changes are done at the proper mileage level.
8. Inventory all parts and supplies and order for a full school year on a planned need basis, with best price.
9. In winter climatic areas, keep all buses under cover rather than allowing drivers to take home and park.
10. Use satellite bus parking stations at the extremities of districts to avoid "deadheading" back to a centralized bus garage.

## The Drivers' Role in Energy Conservation

1. Retain experienced drivers as long as possible.
2. Re-educate bus drivers toward better fuel economy.
3. Reduce warm-up time on buses to 2 minutes initially and 3 minutes prior to starting routes. Drivers should dress warmer rather than running engines at full idle to heat buses.
4. Drive slowly and carefully the first few miles until vehicle warms up.
5. Avoid full throttle operation. (Place governors on engines?)
6. Avoid the "red line" even in shifting gears.
7. Drive slowly back to the bus yard.

8. Reduce speed limit to as low as practical.

9. Avoid Courtesy stops.

10. Train new drivers on existing runs while bus is "deadheading."

11. Use simulators to reduce behind-the-wheel training in vehicles.

12. Increase frequency of driver inservice programs.

13. Do not warm up bus early to let heaters work. Allow heater to warm during trip from garage to first stop. (Drivers should dress warmly during winter months.)

14. Train drivers to use pre-planned starts and stops for less gas consumption.

15. Hold joint workshops with maintenance and driver personnel to improve operation.

16. Use an incentive system for reducing vehicle fuel consumption.

17. If bus drivers have split shifts, determine if their last route ends near their homes. If they do, have them take the bus home during the mid-day period. This will eliminate the extra driving that results from a driver bringing the bus back to the terminal, driving his car home, driving his car back to the terminal, etc.

## School Policies Regarding Daily to-and-from School Operation

### The School Bus Operation: Routing

1. Fill buses to legal capacity.

2. Re-evaluate your routing to make it as efficient as possible.

    a. Consider letting one bus bring children of all ages in from remote and longer runs using a central drop-off spot for their regular bus in town to pick them up for deposit at correct school.

    b. Stagger school hours to the extent that you are able to utilize buses to maximum load levels--not necessarily to grade levels.

    c. Utilize computerized routing facilities, if available. Eliminate overlapping of routes if you have any, whether it is between districts, schools, or several contractors.

d. Use "zone loading" with designated stops spaced as far apart as is feasible. The bus makes fewer stops to load more pupils at the most centrally located areas. (Keeping on the time schedule becomes critical to the success of this method.)

e. Have rural students walk up to the main road for loading. (Ride bike, parents bring them, etc.)

## School Bus Operation: General

1. Have older students walk to central pick-up points.
2. Lengthen distances between pick-up points.
3. Avoid courtesy stops.
4. Plan stops on level instead of on inclines.
5. Consolidate loads.
6. Plan routes to make only right-hand turns to save on idling time where safety in routing permits.
7. Use intercoms on buses to reduce stops for controlling discipline.
8. Reduce weight by removing luggage racks, extra tire, chains, etc. (during warm weather).
9. Install 2-way radios to direct operation or redirection of buses to avoid unnecessary use.
10. Monitor use of vehicles. Install trip recorders to record driver and vehicle operation. Use this information to reduce use of gas and oil.
11. Use modern analyzing equipment to ensure fuel and oil economy.
12. Use the smallest practical vehicle for long-distance, light-load runs.
13. Schedule bus routes to avoid driving up hills; stay on main roads only.
14. Let school staff members ride school buses whenever feasible.
15. Use bus contractors if available. (Escalation clauses.)
16. Hold joint workshops with maintenance and bus driver personnel to improve operation of vehicles.
17. Emission controls; i.e. catalytic converters, additives.

## School Bus Operation: School Policy

1. Coordinate school calendars and start and dismissal times between elementary and secondary schools of each school system.
2. Eliminate staggered dismissal times in the same buildings.
3. Increase requirements for distances children must walk to school and to bus stops (possibly controversial).
4. Overlap elementary and secondary grades and routes. Minimize staggered school schedules.
5. Eliminate trips designed for the convenience of students between school buildings.
6. Encourage pupils to ride school buses in lieu of their own motor vehicles.
7. Eliminate buses for detention students.
8. Limit student parking, encourage high school pupils to ride school buses, form car pools, etc.
9. Explore the satellite concept where classrooms are located away from a central campus. Rent unused houses, churches, and other buildings.
10. Develop innovations and creative programs to encourage students and staff to walk to school or ride bikes. Furnish adequate bike racks. Provide adequate safety for bikes from theft and vandalism.
11. Combine deliveries with bus routes. Use buses for deliveries where and when feasible.
12. Use school buses for public service, youth transportation, elderly, etc., in off hours. Availability of fuel will be key to this supplementary type of service. (Fuel allocations to community service groups will be possible when private passenger cars are not able to buy fuels. Also, if rationing becomes a reality, some planning will be necessary, especially in small, rural areas where people might be without supplies, medicines, etc. Empty buses going one way could be utilized with planning and communication.)

## School Bus Operation: Activity & Field Trips

1. Surveys show field trips use 7% to 10% of fuel allocation totally consumed for transporting pupils to and from school during the 1972-73 school year.
2. Reduce or eliminate all but the most necessary athletic contests.

3. Reduce or eliminate all but the most necessary field trips.
4. Combine field and athletic trips for more than one school.
5. Have districts share buses when holding athletic events.
6. Establish minimum and maximum distances for field trips and athletic trips.
7. Limit field trips to full bus loads only. (Perhaps picking up from several schools en route to game.)
8. Combine athletic schedules so several games can be played at the same time.
9. Encourage parents to pool with other parents in transporting children to school for late activities and for extra curricular events. Provide professional help if additional insurance coverage is needed by parents. Arrange for low cost premiums. Consider having the district assume some of the insurance costs.
10. Contract with parents to provide transportation.
11. Use charter and public transportation and their loading and unloading stops where feasible to drop off rather than return to school or homes.
12. Connect schools with cable TV or closed circuit TV for instruction, inservice meetings, and reports.
13. Use shuttle buses for students to and from athletic contests.
14. Review and evaluate all security measures in the district. Make changes to take care of any increased problems resulting from the energy crisis.
15. Change legislation which caused some buses to have capacity reduced.

Miscellaneous Supplies
(Lubricants, Additives, Accessories, etc.)

1. The smaller supply of antifreeze has placed it in critical demand because of the energy crisis. As with fuel, antifreeze availability and increased costs have put it in a high priority profile with fuel and therefore must be reckoned with when we discuss the areas of energy conservation.
2. Tips for antifreeze:

   a. Check your radiators for leaks, rust, clogging, etc.

   b. Use only the needed amount of antifreeze as mean temperature dictates.

   c. Covered or heated bus garages eliminate frozen radiators and cracked blocks.

Discussion Areas

1. Tires: radials appear to increase mileage

2. Reasons for warehousing where practical:

   a. Bulk Purchasing
   b. Inventory and Audit of Supplies (How Frequently?)
   c. Purchase Orders and Requisition System
   d. Regulated Personnel Handling of Supplies

3. Gasoline vs. Diesel Engines: recommend annual review for districts

4. Locked Gas Pumps (metered fuel record)

5. Regular Bus Maintenance Records (should be kept and updated as needed)